APP 9015S

APP 9022S

Service Power Supply

Installation and Operation Manual

Effective: January 2002

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Service Power Supply

Installation and Operation Manual

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January, 2002
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Purpose of this Manual: The purpose of the APP Service Power Supply Manual is to detail system features, system operation, options installation and maintenance procedures. It is written primarily for the system operator.

NOTE: Alpha Technologies' products are subject to change through continual improvement processes. Therefore, specifications and/or design layouts may vary slightly from descriptions included in this manual. Updates to the manual will be issued when changes affect form, fit or function.

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Contact Alpha

General product information
and customer service
7:00 AM to 5:00 PM Pacific Time
1-800-863-3930

To obtain complete technical support
7:00 AM to 5:00 PM Pacific Time
or
For after-hours *emergency* support
7 days per week, 24 hours a day
1-800-863-3364

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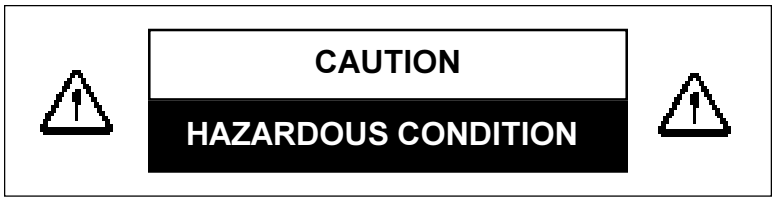
Safety Symbols Used in this Manual



To reduce the risk of electrical shock, injury or death caused by moving parts or the explosion of fuel, and to ensure the safe operation of this unit, the following symbols have been placed throughout this manual. Where these symbols appear, servicing must only be performed by qualified personnel.

Dangerous Voltage
This symbol indicates that a "dangerous voltage" exists in this area of the product. Use caution whenever working in the area to prevent electrical shock.

Attention
This symbol indicates important installation, operation or maintenance instructions. Always follow these instructions closely.

Safety Precautions

- The APP Service Power Supply must be installed and serviced by qualified personnel.
- Always use proper lifting techniques whenever handling units, modules or batteries.
- Verify the voltage requirements of the equipment to be protected (load), the AC input voltage to the power supply (line), and the output voltage of the system prior to installation.
- The utility service panel must be equipped with a properly rated circuit breaker for use with this power supply.
- Do NOT exceed the output rating of the power supply, when connecting the load.
- Use a bucket truck or suitable climbing equipment, such as safety harness and spikes, whenever installing or servicing pole-mount installations.
- Do not let exposed battery cables come in contact with the chassis or enclosure.

Utility Power Connection Notes

CAUTION: Installation must be performed by qualified service personnel only, and in compliance with local electrical codes. Connection to utility power must be approved by the local utility before installing the power supply.

CAUTION: A "high magnetic" trip breaker must be used in order to accommodate the high-inrush currents normally associated with the start-up of ferroresonant transformers (400 Amp, no-trip, first-half cycle). Do not replace this breaker with a conventional service entrance breaker. Alpha recommends only Airpax breakers because of increased reliability in this powering application.

NOTE: UL and NEC require that a service disconnect switch (UL listed) be provided by the installer and be connected between the power source and the Alpha power supply. Connection to the power supply must include an appropriate service entrance weather head.

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Verify that the following items have been included in the shipping container:

APP 9015S:

1. APP 9015S Service Power Supply

2. Power cord with 5-20P plug (120VAC)

NEMA 5-20 Plug

3. Power cord with 6-15P plug (240VAC)

NEMA 6-15 Plug

4. Output cable, single Jones

APP 9022S:

1. APP 9022S Service Power Supply

2. Power cord with 5-20P plug (120VAC)

NEMA 5-20 Plug

3. Power cord with 6-15P plug (240VAC)

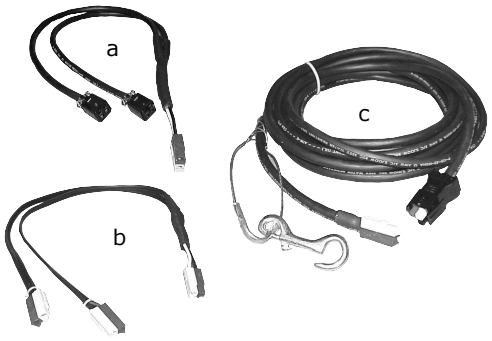
NEMA 6-15 Plug

4. Y-cable with Jones connectors

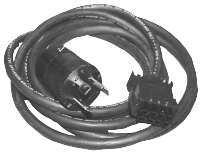
5. Y-cable with 25A connectors

APP 9022S, *continued*

6. Optional 30-Ft Output kit, includes:
   a. Y cable adapter for Jones connector
   b. Y cable adapter for 25A connector
   c. 30-Ft cable



7. Optional 10-Ft cord with 30A connector and Twist Lock plug (125VAC)



NEMA L5-30R Plug

Inspect the contents. If items are damaged or missing, contact Alpha Technologies and the shipping company. Most shipping companies have a limited claim period, so it is important to report damage immediately.

Save the original shipping container.

In the event that a unit must be returned for service, Alpha requests that it be packaged in its original shipping container. If the original container is not available, make sure the unit is packed with at least three inches of shock absorbing material to prevent shipping damage.

NOTE: *Do not* use popcorn-type material. Alpha Technologies is not responsible for damage caused by improper packing on returned units.

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1.1 The APP Service Power Supply

The APP Service Power Supply (SPS) is a portable device used to provide temporary power while the existing power supply is being serviced. The APP SPS can be used in either pole- or ground-mount enclosures to provide signal processing equipment in Cable Television and Broadband LAN distribution systems with current-limited, regulated AC power.

The APP SPS contains a front panel ammeter to measure the output current to the load; an output breaker to protect against excessive short circuit currents; an "Output" indicator to verify AC output power; an input breaker to provide additional voltage protection; and a 60/75/90 VAC switch for output voltage selection.

MODEL	APP 9015S	APP 9022S
Input Voltage (VAC)	120/240 ± 15%	120/240 ± 15%
Input Frequency (Hz)	60 ± 3%	60 ± 3%
Input Current (A)	12	12.5 @ 240 VAC max* 18 @ 120 VAC max*
Output Voltage (VAC)	60/75/90 ± 5%	60/75/90 ± 5%
Output Current (A)	15	22A (240 VAC in*) 17A (120 VAC in*)
Output Power (VA) (Continuous)	1350	1350/1650/1700
Output Current Limit	150% of Output Rating	150% of Output Rating
Efficiency	90% typical @rated load	90% typical @rated load
Finish	Flat Black	Flat Black
Operating Temperature Range	-40° F to +122° F (-40° C to +50° C)	-40° F to +122° F (-40° C to +50° C)
Dimensions (in/mm) (H x W x D)	9" x 9.5" x 13.75"/ 241 x 229 x 349	9" x 9.5" x 13.75"/ 241 x 229 x 349
Weight (lbs/kg)	47/21	60/27
Enclosure Type	NEMA 1	NEMA 1
Certifications		CSA Approved

*Figures shown reflect use with power cord supplied with unit. For 22A @120V, use optional 30A 125V cord (27 A max).

Table 1-1; Specifications

1.2 Theory of Operation

The APP SPS contains a ferroresonant transformer and a resonant capacitor. During AC LINE operation, utility power is fed into the primary winding of the ferroresonant transformer, T1. An AC capacitor, C1, forms the resonant circuit of the ferroresonant transformer which provides excellent noise and spike attenuation, short circuit current limiting, and output voltage regulation. Note: The ferroresonant transformer produces a "quasi" square wave output which resembles a rounded square wave.

AC power enters the Service Power Supply where it is regulated (at the required output voltage) and passed onto the load via the Service Power Inserter (SPI) located inside the power supply enclosure. A switch, located on the SPI, toggles output power from the power supply requiring service to the APP SPS.

NOTE: When measuring the output voltage of ferroresonant transformers, use only a true RMS AC voltmeter. Non-RMS reading meters are calibrated to respond to pure sine waves and will not provide an accurate reading when measuring a "quasi" square wave output.

1.3 APP Service Power Supply Features

Output Current (Ammeter)

The Ammeter displays output current flowing from the power module to the load. When there is no load at the output, the Ammeter reads zero.

Output Breaker

The AC output breaker protects the load from excessive durations of short circuit current, or an out-of-phase (or buck) condition. If the front panel ammeter reads zero, indicating no output to the load, this breaker must be checked, and reset if necessary.

Input Breaker / Power Switch

The AC input breaker protects the Service Power Supply from short circuit conditions, especially when it is used in conjunction with a generator during outage conditions. If the unit does not turn ON when power is applied, first verify that the unit is plugged into the convenience outlet and that the main AC circuit breaker is in the ON position.

Output Power Indicator (9022) / Pilot Light (9015)

The Output Power Lamp displays the presence of output AC voltage.

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1.3 APP Service Power Supply Features, *continued*

Output Voltage Selector

The VAC switch is used to select the desired output voltage. Output options are 60, 75 and 90 Volts.

NOTE: Verify that output voltage settings are correct *before* operating power supply. Do not rotate switch when unit is in operation. Always remove power from unit when selecting output settings.

60/ 75/ 90 VAC Output Connector

The 60/ 75/ 90 VAC output connector supplies up to 22 Amps of power to a Service Power Inserter (SPI) through an output cable.

Output Cables

9015S:
Included with the APP 9015S is an output cable used to connect the Service Power Supply to the SPI, via a four-pin Jones connector.

9022S:
Included with the APP 9022S are two 6-ft output "Y" cables. One cable terminates with two Jones connectors, and provides service power to one or two separate 20A SPIs. The other cable terminates with two 25A connectors, for 25A SPIs.

Input Connector

Input Connector is used to connect the APP SPS to line power through an AC line cord. The cord plugs directly into enclosure convenience outlet.

The APP 9022S includes two power cords: One with a 5-20P plug to set voltage to 120 VAC; and one with a 6-15P plug to set voltage to 240 VAC.

9022s Option: 30-Ft Output Cables

A 30-foot output kit is available. This kit provides "Y" cables for both 25A and Jones connectors. Alpha part number: 745-094-20.

9022S Option: 10-Ft Cord w/30A Connector and Twist Lock Plug (125VAC)

For use with a twist lock receptacle, this line cord is equipped with a NEMA L5-30P plug. Alpha part number: 874-935-22.

1.3 APP Service Power Supply Features, *continued*

Figure 1-1; APP 9015S Service Power Supply, Front Panel

1. Output Current
2. 120/240V Input Voltage Selector
3. 20 AMP AC Input Breaker/Power Switch
4. 120/240V Input Connector
5. Output Voltage Selector
6. 60/75/90V Output Connector
7. 20 AMP Output Breaker
8. Pilot Light

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1.3 APP Service Power Supply Features, *continued*

Figure 1-2; APP 9022S Service Power Supply, Front Panel

1. Output Current
2. Output Power Indicator
3. 30 AMP Output Breaker
4. 60/75/90V Output Connector
5. Output Voltage Selector
6. 120/240V Input Connector
7. 25 AMP AC Input Breaker/ Power Switch

2.1 APP SPS Installation and Power Module Removal

Procedure

1. Locate Service Power Inserter (SPI) in enclosure. (Refer to Figures 2-1 and 2-2.) For 20A SPI, plug APP SPS "Jones" connector into SPI. (Figure 2-1.) For 25A SPI (9022S model only), plug APP SPS into red and white 25A connectors. (Figure 2-2.)

2 Determine the line voltage of the UPS.

3. *For APP 9015S model only:*
Select appropriate line voltage (120/240 VAC) by using the Input Voltage Selector switch.

4. Select and connect appropriate line cord to Input Connector and plug into outlet.

CAUTION: Do not use the 120 VAC cord to plug into GFCI outlet! The GFCI outlet is intended for lights and tools only. If necessary, remove the LAP and use that outlet.

5. Set the 60/75/90 VAC selector switch to the desired voltage. Plug the APP SPS power cord into the enclosure's convenience outlet. (See Figures 2-3 and 2-4.) Switch the APP SPS ON, and verify that the output power indicator is lit.

6. Toggle the SPI's ALT/ON switch to ALT. This transfers output power from the module to the APP SPS which can now be used to maintain regulated, non-standby power to the cable plant until a replacement power module has been installed.

7. Switch the battery breaker on the power module OFF.

8. Unplug the power module LINE cord from the enclosure convenience outlet.

9. Wait approximately 1 minute for the power module capacitors to fully discharge.

10. Disconnect the wires from the power module.

CAUTION: Do not let exposed battery cables come in contact with the chassis or enclosure.

11. Reverse this procedure when reinstalling a module.

CAUTION: The ferroresonant transformer generates heat and may cause burns if handled with bare hands.

NOTE: Always test the power module for proper operation before toggling the SPI's "ALT/ON" switch back to the ON position.

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2.1 APP SPS Installation and Power Module Removal, *continued*

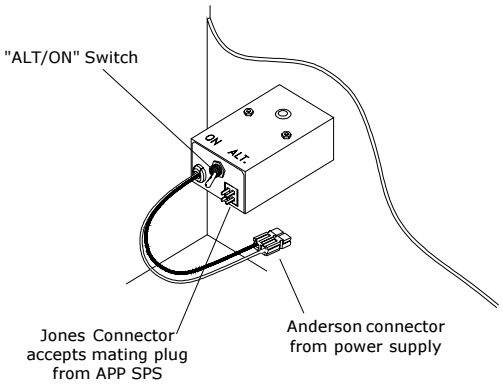

Figure 2-1; 20A Service Power Inserter (shown in PWE and UPE/M enclosures)

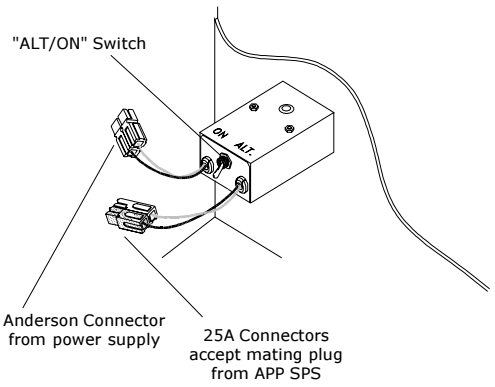

Figure 2-2; 25A Service Power Inserter (shown in PWE and UPE/M enclosures)

3.1 Trouble-Shooting Guide

The trouble-shooting guide is designed to display typical symptoms, causes and solutions, starting with the most obvious and working systematically through the unit. Alpha Technologies recommends that the power supply maintenance log accompany units brought in for bench service to aid the technician in trouble-shooting the problem.

Symptom #1:
No output to cable; No AC line power; Green Output Power indicator OFF:

Probable Cause:	Solution:
AC line cord unplugged	Plug in AC line cord
AC input circuit breaker tripped (or input fuse open)	Reset AC circuit breaker
Utility power outage	Use voltmeter to verify correct voltage (120/240 VAC) at receptacle. Connect generator in the event of an extended power outage.

Symptom #2:
No output to cable; AC line power available; Green "Output Power" indicator ON; And Ammeter reads "0":

Probable Cause:	Solution:
AC output breaker has tripped	Reset output breaker
SPI "ALT/ON" switch in wrong position	Move switch to "ALT" position
"Jones" connector loose or not connected to SPI	Check connection
Loose seizure screw inside SPI	Tighten screw

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3.1 Trouble-Shooting Guide, *Continued*

Symptom #3:
Incorrect output voltage; And/or Ammeter reads excessive current (above rated output of APP SPS):

Probable Cause:	Solution:
60/75/90 VAC switch in wrong position	Move switch to required position
Wrong type of voltmeter used	Use true RMS voltmeter
Under-loaded output (less than 1 Amp)	Connect load
Overloaded output	Reduce load
Short exists in load	Locate and remove short
MOV shorted in SPI	Replace SPI
APP 9015S only: 120/240 V switch in wrong position	Set switch to correct line voltage

3.2 APP 9022S Schematic

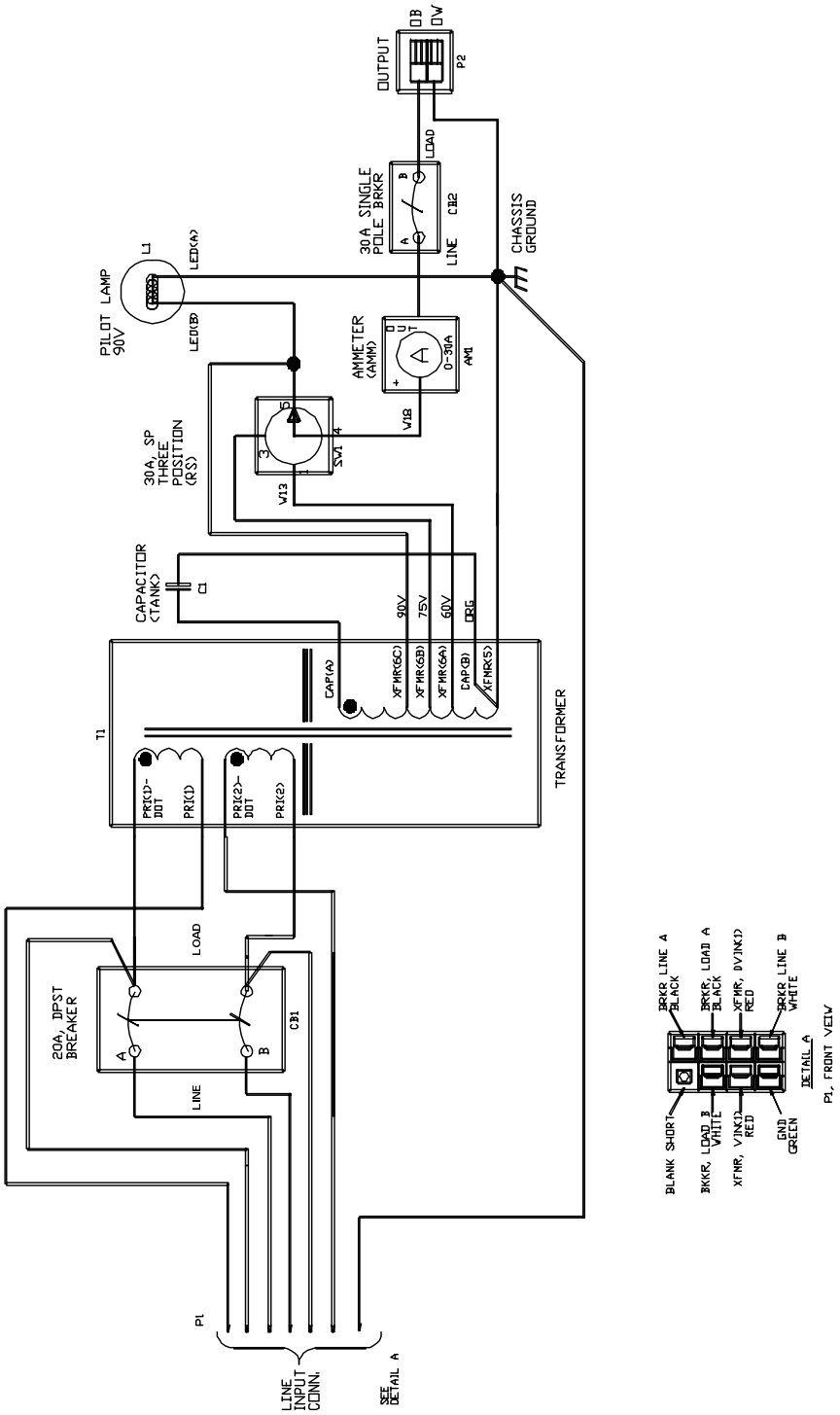

Figure 3-1; APP 9022S Service Power Supply Schematic

Preliminary

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3.3 Returns, Repair, and Parts Ordering

Returns for Repair

For units that must be returned for repair, Alpha requires a Return Material Authorization (RMA). An RMA can be obtained from Alpha Customer Service, using either method listed below:

- Download the necessary forms directly from Alpha's Web site, under "Customer Service": **www.alpha.com**
- Or call (800) 322-5742 for assistance.

Clearly mark the RMA on the unit's original shipping container. If the original container is not available, make sure the unit is packed with at least three inches of shock absorbing material to prevent shipping damage.

NOTE: *Do not* use popcorn-type material. Alpha Technologies is not responsible for damage caused by improper packing on returned units.

In addition to the returned unit, please include a copy of the power supply maintenance log and any information relevant to the power supply failure.

Returns for Credit

For returns for credit, call (800) 322-5742.

Parts and Ordering Information

To order parts, contact the Alpha Technologies Customer Service Department directly at:

United States and Latin America:	(360) 647-2360
Canada:	(604) 430-1476
United Kingdom:	44-279-422110
Germany:	49-9122-997303
Middle East:	357-5-375675

To obtain **emergency** technical support
(7 days/week, 24 hours/day) call:

1-800-322-5742 (USA)

1-800-667-8743 (CANADA)

[Power]

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